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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,629	11/21/2003	Derek Raybould	H0003891-1170	3479

7590 11/16/2006

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EXAMINER
MILLER, DANIEL H

ART UNIT	PAPER NUMBER
1775	

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/719,629	RAYBOULD ET AL.	
	Examiner	Art Unit	
	Daniel Miller	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-15 and 17-71* is/are pending in the application.

4a) Of the above claim(s) *36-71* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-13,15,17-26 and 28-35* is/are rejected.

7)☒ Claim(s) *14 and 27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The finality of the previous Office action has been withdrawn. Applicant's submission filed on 10/23/2006 has been entered.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3, 4, 6, 8-9, 21 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (U.S. 6,759,151).

3. Lee teaches a protective coating system used to cover a Si-based substrate in a turbine engine (column 2 line 55-60).

4. Regarding claims 1 and 10, the reference teaches a Si based substrate. The silicon substrate is SiC (diffusion barrier) and/or comprises a SiN4 in a liner form (figure 5). Regarding claim 1, Lee teaches an oxygen barrier layer formed from mullite and then an environmental barrier comprising metallic disilicate (BSAS figure 3a and 4b), followed by a thermal barrier or second environmental barrier of (HfTaO4). All of which would inherently function as claimed by applicant.

5. Lee also teaches an oxygen barrier layer that comprising metallic disilicate (BSAS figure 4b), and an environmental barrier coating (see figure 4b) comprising HfTaO4 (which is a tantalum oxide alloy, see figure 4b). The outer (environmental barrier layer) may also comprise a combination of alumina and tantalum oxide (column 3 line 24-36). Regarding claim 22, the reference teaches the diffusion barrier, an oxidation barrier and an environmental barrier, as stated above. Further, there is a topcoat (thermal barrier) that can be (YSZ) (column 1 line 65-68) (also meeting limitations of claim 21).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-6, 8-13, 15, 17-26, 28-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee II (U.S. 6,733,908) in view of Lee (U.S. 6,759,151).

8. Regarding claims 1, 10, 17, and 22, Lee ('908) teaches a protective coating system used to cover a Si-based substrate in a turbine engine (column 1 line 20-30).

9. Regarding claims 1 and 10, Lee ('908) teaches a Si based substrate with an oxygen barrier layer that comprising metallic disilicate (BSAS figure 2 and 6), and an environmental barrier coating. Regarding claims 1, 10 and 17, the surface of the silicon

substrate is SiC (diffusion barrier) or can comprise a SiN4 or silicon oxynitrate (column 8 line 17-37). Regarding claim 1, 16, 21 and 22, the topcoat can be a (YSZ) thermal barrier coating (figure 2 and abstract). However the reference is silent as to the composition of intermediate layers or the composition of the environmental barrier.

10. Lee ('151) teaches a protective coating system used to cover a Si-based substrate in a turbine engine (column 2 line 55-60).

11. Lee ('151) further teaches an environmental barrier coating comprising HfTaO4 (which is a tantalum oxide alloy required by applicant's claims 7, 17, 20 and 22, see figure 4b reference). The outer (environmental barrier layer) may also comprise a combination of alumina and tantalum oxide (column 3 line 24-36).

12. It would have been obvious to use to one of ordinary skill in the art to use the layers Lee '151 in the article of Lee '908, as the layers of Lee '151 are Low CTE layers because they provide environmental protection from water and vapor.

13. Regarding claim 2, both diffusion barriers (the surface of the substrates) can be SiC (diffusion barrier) or comprises a SiN4 or silicon oxynitride (Lee '908 column 8 line 17-37).

14. Regarding claims 3-4, 11 and 15, the inner layer can be SiON2 and the outer layer can be RE2Si2O7 where RE is Sc or Yb (column 7 line 60-68 Lee '908).

15. Regarding claim 5, Lee ('908) contemplates an oxide ceramic such as mullite, which would have SiO2 present on the surface of the substrate and render obvious a SiO2 layer (diffusion barrier) (column 8 line 30-37).

16. Regarding claims 6, 12, and 19, Lee ('908) teaches that layer (22) comprises at least one of the disilicate mentioned above addressing claims 3-4 and a monosilicate, ReSiO5 (column 7 line 60-68), and Hafnia, a metal oxide.

17. Regarding claim 8, the top coating (thermal barrier) can be (YSZ), which is a zirconium oxide alloyed with a yttrium oxide (figure 2 and abstract Lee '908).

18. Regarding claim 9, Lee ('151) teaches layer 22 increases in concentration of stabilized zirconia as you move to the outer portion of the layer.

19. Regarding claims 13, 18, and 24, Lee ('151) teaches the ceramic substrate can be a Si-containing ceramic, such as silicon oxynitride, or oxide or a CMC composite (column 8 line 23-27). Therefore, it would be obvious to have a silicon oxynitiride surface and a silicon nitride core substrate since both are contemplated (column 8 line 20-25). Further, the outer layer is a metallic disilicate (figures 2 and 6).

20. Regarding claims 23, 24-25, 29-31, and 35, it would have been obvious through routine experimentation to optimize the coating thicknesses to provide the best protective properties.

21. Regarding claim 28, Lee ('908) teaches that layer (22) comprises at least one of the disilicate mentioned above addressing claims 3-4 and a monosilicate, ReSiO5 (column 7 line 60-68), and Hafnia metal oxide. The reference discloses (figure 2) a (BSAS) coating falling within the claimed range of 60-100%.

22. Regarding claims 32-33, these claims are obvious in view of the reference. When the final product is disclosed either by a single reference or by a combination of

references in a product by process claim the process limitations are not indicative of patentability.

23. Regarding claim 34, the surface of the silicon substrate is SiC (diffusion barrier) or can comprise a SiN4 or silicon oxynitrate (column 8 line 17-37 Lee '151).

Allowable Subject Matter

24. Claims 14 and 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

25. Applicant's arguments with respect to claims 7, 10, 17, 20 have been considered but are moot in view of the new ground(s) of rejection. Claim 20 has been newly rejected (see above). Applicant's arguments filed 10/23/2006 have been fully considered but they are not persuasive. Applicant has argued that there is no teaching of a metal disilicate using a complex of the Si2O7 (-6) ion in the references. Please see where the outer layer is taught to be RE2Si2O7 where RE is Sc or Yb (column 7 line 60-68 Lee '908). Regarding the 102 rejection of claims 10 and 17 they have been withdrawn due to amendment and argument respectively. Regarding the 103 rejection, applicant's arguments were against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Therefore the rejection is maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Miller whose telephone number is (571) 272-1534. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Miller

JENNIFER MCNEIL
SUPERVISORY PATENT EXAMINER
11/13/06